

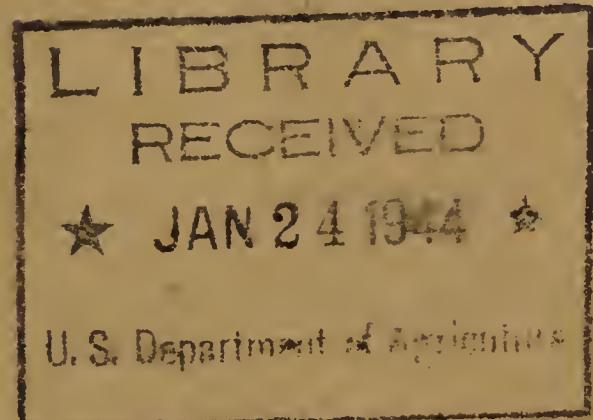
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U. S. DEPARTMENT OF AGRICULTURE
AGRICULTURAL RESEARCH ADMINISTRATION
BUREAU OF ANIMAL INDUSTRY

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**INSTRUCTIONS FOR EMPLOYEES
ENGAGED IN ERADICATING
FOOT-AND-MOUTH
DISEASE**

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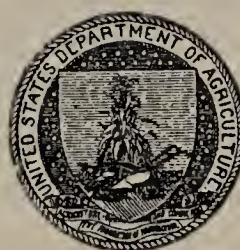
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UNITED STATES DEPARTMENT OF AGRICULTURE,
AGRICULTURAL RESEARCH ADMINISTRATION,
BUREAU OF ANIMAL INDUSTRY,

Washington, D. C., September 1, 1943.

To BUREAU EMPLOYEES:

The following information and instructions regarding methods to be followed in the eradication of foot-and-mouth disease are issued only for the guidance of Bureau employees and cooperating agencies. Persons who are not familiar with the disinfectants and fumigants mentioned in this publication should consult an inspector in charge or other Bureau official before attempting to use any such materials in this work. These instructions are supplemental to the various Department orders and regulations relating to this subject.

A. W. MILLER,
Chief of Bureau.

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INSTRUCTIONS FOR EMPLOYEES ENGAGED IN ERADICATING FOOT-AND-MOUTH DISEASE

INTRODUCTION

The following instructions are issued for the information and guidance of employees of the Bureau of Animal Industry and others who may at any time be engaged in the eradication of foot-and-mouth disease. These instructions are supplementary to and are not intended in any manner to supersede or conflict with any regulations which have been, or later may be, issued by the Department.

All veterinarians in public and private service and all practicing veterinarians should constantly be on the lookout for foot-and-mouth disease. Notwithstanding the fact that the Department has taken every practicable precaution to eradicate outbreaks when they occur and to prevent the introduction of the disease into this country, the infection may recur or again be introduced from abroad. If in the examination of animals any condition is found that arouses suspicion of foot-and-mouth disease, a careful inspection should be made along the lines herein outlined, and the Chief of the Bureau immediately informed of the situation by telegraph. In order to keep in mind the symptoms and lesions of the disease, veterinarians should read from time to time Farmers' Bulletin 666, as well as other standard veterinary works on foot-and-mouth disease.

INSPECTION

Parts to be examined.—Good light and restraint of the animals are essential in making careful inspections. All cattle, sheep, other ruminants, and swine, which are suspected of being infected with foot-and-mouth disease, should be carefully and systematically examined in order to determine whether such infection exists. The same precaution should be taken if there is any reason to suspect that foot-and-mouth disease exists on the premises. This inspection should include the mouth, feet, teats, udders, and perineums of cows for the specific lesions of the disease, and the mouths and feet of sheep, other ruminants, and swine..

Lesions.—The specific lesion is the vesicular eruption in the form of vesicles or blisters with fluid contents, but next in order of importance in diagnosing the disease is the erosion showing abrupt borders which cause it to present a punched-out appearance. The most conspicuous chronic lesions are the rings on the hoofs and deformities of the feet. Temperatures of all animals in the herd should be recorded when it is practicable to do so.

Scope of inspection.—The examination should not be confined to the suspected animals, but should include all susceptible animals of different species on the farm, and if the suspicion of foot-and-mouth disease is strong, the inspection should extend to animals on adjacent farms. The number of animals affected and the kind of lesions should be noted. Special inquiry should be made into the history of the condition, and all information available should be considered with the view of ascertaining whether there is any evidence of contagion. The names and home

addresses of employees, especially milkers, should be recorded immediately when premises are quarantined. This will assist inspectors in finding them should they leave the infected premises.

When it is learned that owners of livestock or their help have visited infected premises within the last 10 days, their premises should be quarantined a sufficient period of time for any infection which may have gained access to develop visible symptoms.

Where range cattle are to be inspected a chute should be provided, if possible, to obviate the necessity of roping. An inspection made by riding among such cattle is not entirely reliable, but if no special facilities are provided this method may be used. The inspector should observe cattle that are standing or lying down and note their movements immediately when they arise and start to walk or run. Suspicious cattle should be placed in a chute or roped and carefully examined.

Report to Chief of Bureau.—In all cases of foot-and-mouth disease, even where there are only slight grounds for suspicion of a new outbreak, the matter should be reported *immediately by wire* to the Chief of the Bureau and a detailed written report forwarded as soon as possible. This report should include a description of the lesions and their location, the number of susceptible animals of each species on the farm, the number of animals of each species affected, the temperature record, and the history, including the evidence, if any, of contagion. Specimens should not be forwarded to the Department except on specific instructions from the Chief of the Bureau. When requested, they should be packed for shipment in accordance with the following instructions:

Material to be forwarded should be carefully selected and placed in tightly sealed double containers. The coverings from unruptured or recently ruptured vesicles are best suited for the purpose. When only erosions are present in suspected cases cotton-swab specimens may be taken from the freshest lesions. This type of material, however, is the least satisfactory. The material should be placed in a preservative such as glycerin-phosphate solution. If a supply of this solution cannot be quickly obtained the materials to be forwarded may be placed in a solution of equal parts of glycerin and boiled water. The container should be labeled and properly identified.

Differential diagnosis.—In all suspicious instances, where a positive diagnosis cannot be made, veterinarians should proceed immediately, without waiting for a reply to their report, to make inoculation tests in hogs and calves, preferably short yearlings. In the absence of reliable serological or allergic tests animal inoculations must be depended upon for the differential diagnosis of foot-and-mouth disease.

All conditions that produce inflammatory changes in the mucous membrane of the mouth and nose and in the skin of the coronary band and the interdigital surface and pads of the feet of susceptible animals must be taken into consideration in establishing a diagnosis of foot-and-mouth disease. Vesicular stomatitis and vesicular exanthema are probably the only conditions that will give an experienced observer any difficulty in reaching a diagnosis provided he keeps the nature of foot-and-mouth disease in mind.

In differentiating between foot-and-mouth disease and vesicular stomatitis it should be remembered that foot-and-mouth disease affects all ruminants and

swine and does not affect equines. Vesicular stomatitis affects equines and cattle; it does not affect sheep; and although hogs can be readily infected experimentally, natural outbreaks have not been reported. The disease does not spread as rapidly as foot-and-mouth disease. While the principal feature of vesicular stomatitis is the formation of vesicles in the mucous membrane of the mouth, these lesions are less extensive than in foot-and-mouth disease. Furthermore, it rarely produces feet and teat lesions. The guinea pig is susceptible to the virus of foot-and-mouth disease and vesicular stomatitis.

Vesicular exanthema is primarily a disease of swine. Horses have been experimentally infected with the virus, but cattle, sheep, and guinea pigs are resistant. The lesions of vesicular exanthema are very similar to those produced by foot-and-mouth disease. It has been reported that quite frequently vesicular formation is accompanied by a marked swelling of the snout, face, and legs.

In tests so far conducted, vesicular stomatitis virus injected intramuscularly does not produce lesions in cattle, while positive results are consistently obtained from such injections of active foot-and-mouth disease virus. Vesicular exanthema virus has failed to produce lesions in cattle by this or any other method of inoculation. Equines are very susceptible to vesicular stomatitis, slightly susceptible to vesicular exanthema, and very resistant to foot-and-mouth disease. Guinea pigs may be infected with the viruses of foot-and-mouth disease and vesicular stomatitis but are resistant to the virus of vesicular exanthema. The guinea pig should be used only by experienced laboratory technicians.

In differentiating vesicular exanthema from foot-and-mouth disease it is always necessary to inoculate cattle and sometimes horses, swine, and guinea pigs. The condition can be considered vesicular exanthema if lesions are produced only in swine and slightly or occasionally in horses.

Summarizing, it may be said, the diagnosis of foot-and-mouth disease is justified when typical lesions (preceded by a rise in temperature) develop in swine, cattle, and guinea pigs but not in horses. A diagnosis of vesicular stomatitis may be considered proper when vesicular lesions develop in cattle, swine, horses, and guinea pigs. The condition would be considered typical of vesicular exanthema when vesicular lesions are produced in swine, and occasionally to a lesser degree in horses, and no vesicular lesions are produced in cattle or guinea pigs.

Inoculation of test animals.—It is of extreme importance that two things be kept in mind in making animal inoculations. The viruses of foot-and-mouth disease, vesicular stomatitis, and vesicular exanthema disappear rather quickly in the infected animals. Therefore, material to be inoculated must be fresh. To insure the virulence of test material, only lymph (vesicular fluid) or the coverings of fresh vesicles should be used. Of equal importance is the susceptibility of the animals to be used in the test. The history of the test animals should be carefully studied to determine positively that they are not, through previous exposure, immune to further inoculations. Therefore, in some instances, it may be necessary to bring in animals from an outside area to be used in the test.

The material to be inoculated may be ground up in a sterile mortar with a small quantity of physiological

saline solution. One or more susceptible cattle should be inoculated. Either a superficial intradermal injection should be made into the mucous membrane of the gum, or some of the material should be applied to a scarified area on the gum and the tongue. In addition, it is desirable to inject some of the material intramuscularly into one or more cattle. One or more horses should be inoculated by applying the virus to a scarified area on the dorsal surface of the tongue.

When time will permit, several temperatures should be taken of the test animals before the inoculation is made. Following the inoculation, temperatures of all test animals should be taken at least twice daily. A detailed record of the daily observations should be entered in a book for future reference.

PROCEDURE WHERE INFECTION IS FOUND

Cooperation with State authorities.—As soon as the diagnosis has been confirmed by the special representative of the Department, the Chief of the Bureau will invite the proper State authorities to cooperate with the Department in the arrest and eradication of the disease, and a veterinarian will be designated to take charge of the work. The latter should promptly ask for the necessary help and cooperate with the State authorities in ascertaining the extent of the outbreak and in formulating State quarantine regulations. He should prevail upon the State authorities to quarantine the infected premises immediately and endeavor to make arrangements with them to place guards on each of the infected premises day and night to see that the quarantine is maintained.

Guards.—The inspector in charge shall specify the number of guards to be used, their duties, and their stations, and they shall work under his supervision.

Guards should be supplied with rubber outfits or other outer clothing that can be disinfected when they leave infected premises or are moved from one station to another. The most important duty of guards assigned to quarantined premises is to see that no person or animal leaves or enters the premises without proper authority. It is not permissible for a guard to disinfect persons and then allow them to leave infected premises. When it becomes imperative for an owner or any of his family or help to leave quarantined premises, application should be made to the inspector in charge, who will designate a competent assistant to do the disinfecting necessary. The inspector in charge should give each guard a letter specifying his duties in detail.

Quarantine.—The owners of affected herds should be fully instructed concerning the nature of the disease and the importance of maintaining a strict quarantine. In addition, they should receive the letter of instructions prepared by the Bureau. The owners of adjacent farms should also be notified and instructed in order that they may take precautions to protect their herds against infection. All stockyards, auction markets, sales yards, etc., in the infected districts should be closed immediately and creameries and cheese factories investigated to see that skim milk, buttermilk, whey, and milk cans are being properly sterilized before being returned to farmers; otherwise the creameries and factories also should be closed. Slaughtering establishments should be placed under strict veterinary supervision to prevent the killing of infected or dangerously exposed animals. Unless this can be done, the plant should be closed. The moving of animals by motortrucks and other conveyances should receive attention.

. **Publicity.**—Publicity of the outbreak should be given from the beginning through the distribution of posters, special circulars, and similar literature; and also through the daily papers, but such information should emanate from headquarters. Inspectors engaged in routine work should not give interviews. Public meetings of farmers and stockmen from the territory bordering the infected area should be called, when it is deemed advisable, to discuss foot-and-mouth disease and the methods to be employed in eradicating it, with particular reference to the duties of livestock owners and what will be expected of them. Stock owners from infected farms should not be permitted to attend these meetings and those from adjacent premises should be discouraged from attending in order to obviate the danger of spreading infection, as all necessary information regarding these matters will be carried to them by veterinary inspectors making farm-to-farm inspections. The inspector in charge of this work should see to it that representatives of the State authorities, members of livestock associations, and interested livestock owners of the community are requested to speak at these meetings.

Transportation of employees and equipment.—Arrangements should be made immediately for the transportation of employees and their equipment so that there will be no delay when the assistants arrive. Transportation should be obtained at as reasonable a rate as possible, consistent with prompt and efficient service. When the State or local agencies cannot furnish the service, such means as are necessary should be procured from other sources. It should be explained to the person or firm furnishing transportation how settlement is made direct from Washington.

Tracing source of infection.—It is important that an investigation be made immediately to determine if possible the source of infection in order to prevent another outbreak from the same source. Veterinarians should be detailed immediately to scout in the community wherever rumor or suspicion leads and to confer with local veterinarians, stockmen, and others concerning the premises which they have visited in order that all infected herds may be found and quarantined as soon as possible. In addition, other veterinarians should be detailed to make a careful systematic investigation of conditions of all livestock within a radius of 3 miles or more of the infected premises, as circumstances warrant.

Tracing shipments.—A report should be obtained of all livestock shipments that were made from the community during a period beginning 10 days prior to the appearance of the disease and ending on the day the quarantine was established. All suspicious shipments should be traced to destinations and back to the farm where the stock originated in order to ascertain whether there was any probability that they were infected when shipped. These precautions should be taken as quickly as possible to limit the spread of the disease.

The veterinary inspectors at various public stockyards should be informed immediately by telephone or telegraph of any diseased, suspicious, or exposed animals that were shipped from the infected community to public stockyards. A record should be made of all railroad cars, motortrucks, and other conveyances that carried infected or exposed animals out of the infected district, and arrangements made with the various railroad companies and truck owners for the cleaning and disinfecting of such cars

and trucks, under the supervision of an employee of the Bureau of Animal Industry, before they are again used.

Ordering supplies.—As soon as the diagnosis of foot-and-mouth disease has been confirmed, the inspector in charge should order by telegraph or telephone supplies enough to meet immediate needs. In order to save time the telephone or telegraph should be used in obtaining prices from different firms handling the needed supplies.

The usual supplies used in combating an outbreak of foot-and-mouth disease are suitcases, rubber goods, such as boots, coats, hats, gloves, also sponges, permanganate of potassium, formaldehyde solution U. S. P., cresylic disinfectants, sodium hydroxide (lye), chloride of lime, and spray pumps. For each pump there should be ordered 100 feet of three-ply steam hose and attachments, two spraying nozzles, and an extra supply of leather valves. Implements, such as shovels, forks, hoes, scrapers, picks, crow-bars, axes, etc., used in connection with the cleaning of the premises before disinfection must also be procured.

ORGANIZATION

Field headquarters.—Headquarters should be centrally located if possible. If the outbreak extends over a large area the territory should be divided into districts, and a substation established in each district. A competent veterinarian should be detailed to take charge in each district. He should be furnished with the necessary assistants and equipment and should be held responsible for the efficient conduct of the work in his district.

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When district substations are established, each substation should forward to the main office at the end of each week a roster giving the names and addresses of both Government and State employees and the number of additional men needed or any surplus that can be transferred.

Care of supplies.—From the beginning a competent lay inspector should be detailed to look after the supplies. His duties should consist in receiving and issuing supplies, keeping records of all supplies received, issued, ordered, or exchanged, and seeing that additional supplies are ordered in time so that they will be received before the supplies on hand are exhausted.

Government property, including tools, guns, suitcases, and rubber goods, should be stenciled "U. S. Department of Agriculture" in an appropriate place so that they may be identified.

Equipment for inspectors.—All veterinarians and others who are engaged in the examination of animals for symptoms of foot-and-mouth disease, or have occasion to visit any premises upon which such animals have been kept, should be supplied with and make use of the following equipment:

1 suitcase or other receptacle for carrying department property, disinfectants, etc. (preferably fiber).

1 rubber coat (special cloth coats may be substituted during extremely hot weather).

1 pair rubber boots.

1 pair rubber gloves.

1 rubber hat (washable cloth hats may be worn in extremely hot weather).

1 fiber washbasin, or, preferably, a fiber pail.

1 sponge.

1 pound can of sodium hydroxide (lye).

- 1 pint vinegar.
- 1 nose lead.
- 1 bucket spray pump.

FARM-TO-FARM INSPECTION

Area to cover.—The inspector in charge of the district, with the aid of a map, should divide the territory into districts, keeping in mind the number of farms, the number of livestock, difficulty of travel, etc., and assign a veterinarian to each district under his supervision with instructions as to how frequently inspections should be made. Farm-to-farm inspection should cover areas of from 3 to 5 miles in radius from infected farms. This order, however, need not be followed literally when there are natural barriers or boundaries, such as rivers, mountains, or forests. On the other hand, when infection has occurred in several places along a frequently used public highway, it is advisable to proceed along this highway and inspect premises for probably 5 miles. As a general proposition, farm-to-farm inspection should extend to all premises situated in any community where there is reason to believe infection may exist. Where large range pastures are involved the inspection should extend considerably beyond a 5-mile radius, depending on intervening fenced inclosures, natural barriers, and other range conditions.

Procedure.—Inspectors on reaching premises where livestock is to be inspected should always put on their rubber outer garments before or immediately on alighting from their conveyance, which should not be driven on to infected premises unless it is necessary to use an automobile in inspecting range cattle. In such instances the automobile should be disinfected just before leaving infected premises. Dur-

ing his first visit the inspector should inform the owner fully concerning the object of his visit, the location of infected premises, the nature of the disease, how it is spread, and advise concerning precautions to prevent the spread of the disease and to whom he should report any suspicious ailment noticed among his animals. Owners should also be encouraged to establish and enforce quarantine measures of their own to protect their herds.

On conclusion of the examination of the livestock, and just before leaving the premises, all employees must thoroughly sponge their rubber hats, boots, gloves, and coats, both on the outside and on those portions of the inside which may become contaminated, with a solution of sodium hydroxide (lye) of not less than 1-percent nor more than 2-percent strength.

Caution.—Great care is necessary in handling lye as it rapidly destroys woolen clothing and shoes and irritates the skin. A weak acid solution, such as vinegar, should be kept in readiness to apply in case the lye solution comes in contact with the skin.

If the weather is extremely warm and cloth coats instead of rubber ones are worn the entire coat should be dipped in the disinfectant until thoroughly saturated.

A fresh solution of disinfectant should be prepared each time inspectors are required to disinfect their outer garments.

The greatest care must be exercised to prevent carrying infection from diseased to healthy herds and to avoid criticism on account of apparent carelessness.

If on visiting premises the disease is found, inspectors must exercise the greatest care in order that the infection may not be spread. None of the special

outer clothing worn by the inspector should be taken from the infected premises, but all of it should be left to be used by members of the disinfecting crew. The inspector should remain on the premises until his diagnosis has been verified. He will then proceed to his headquarters and should not visit any other premises until he has made a complete change of clothing. All clothing worn should be thoroughly dry-cleaned or laundered.

Number of inspections.—Daily inspections, for a period of at least 10 days, should be made of all livestock in the neighborhood of infected premises. The first inspection should commence as soon as possible after an affected herd is discovered and should include all susceptible animals within a radius of at least 2 or 3 miles of the infected premises. The inspection of premises outside of the specified area should extend at least 5 miles from the known infected area and should be repeated at least every 7 to 10 days until the disease is under control.

Method of inspection.—When there is no reason to suspect that infection exists on premises and there is no history of exposure it will not be necessary for the veterinarian to enter the lot in which the animals are being held. The owner should be given a clear description of the symptoms of the disease and carefully questioned as to whether any such condition has been noticed. He should also be requested to have the animals moved close to the fence surrounding the enclosure in order that a good look may be had at each individual. When there is reason to believe that infection is present on the premises or the owner reports any suspicious condition an inspection should be made as described in the first paragraph under Inspection on page 2.

Record of inspections.—Each inspector should keep a record of all inspections made in a field book provided for the purpose. This record should show the name of the person or firm furnishing the conveyance, the price, the name of each owner of animals inspected, number of animals of each species inspected, and the condition of the animals when inspected. The veterinarian detailed to make the second or subsequent inspection should have with him the record of the previous inspections to guide him.

Report to headquarters.—At the end of each day's work the inspector in charge of each substation should be required to make a report to headquarters by telephone, telegraph, or otherwise, showing:

1. Number of new infected herds discovered.
2. Number of infected herds slaughtered.
3. Number of infected herds awaiting slaughter.
4. Number of infected herds appraised.
5. Number of infected herds awaiting appraisal.
6. Number of trenches ready.
7. Number of trenches being dug.
8. Number of premises disinfected.
9. Number of premises where herds have been slaughtered and the premises are ready for disinfection.

When this information has been collected for an entire district, the inspector in charge should forward the facts in a night letter (telegram) to the Washington officials for their information.

DISPOSAL OF INFECTED HERDS

Confirmation of diagnosis.—As soon as foot-and-mouth disease is reported by a veterinarian, the diagnosis should be confirmed by at least one other

veterinarian who has had considerable experience with the disease. After the diagnosis has been confirmed, arrangements should be made for the disposal of the animals (digging a trench, etc.), and while these arrangements are being completed the animals should be appraised.

Appraisal of animals.—Appraisals are usually made by two appraisers working together, one a representative of the State and one a representative of the United States Department of Agriculture. Care should be exercised in selecting appraisers in order to see that only men of proper temperament and good judgment, who are familiar with the various classes of livestock, are chosen for this duty. Appraisements must be made in accordance with State and Federal regulations.

The appraisers' records should show whether the animals were appraised at a dairy, meat, or breeding value. A description (bull, steer, cow, heifer, calf, hog, sheep, and approximate age) of the animals and their appraised value should be a matter of record, and one copy of this record should be given to the owner when the appraisal is finished. Owners should be invited to be present or have a competent representative present to confer with appraisers in placing values on animals. Owners should not be permitted to write any protest or reservation on the agreement form signed by them.

Where several owners have cattle on the same premises, that farm or ranch should be considered as a unit. However, each owner's cattle will be appraised in his name and considered a separate herd. It should be explained to the owner or his representative at the time the appraisal is made how indemnity claims are handled. The correct names and the ad-

dresses of owners to whom checks are to be mailed must be obtained. A full report regarding outstanding mortgages and liens should be submitted by the appraisers with each appraisal.

Photographers and visitors.—No photographers or other visitors should be allowed on infected premises or to witness the slaughtering and burial operation unless they have obtained in advance permission from headquarters.

Trenches for burying animals.—Where animals are to be disposed of by slaughter and burial, the digging of the trench should be started as soon as possible after the diagnosis has been confirmed. The owner of the affected herd should be induced, if possible, to take the contract for digging the trench, but if he refuses or is not equipped so to do, a contractor should be hired to do the work. A lay inspector should be detailed to supervise the digging and should be instructed to remain on the premises until the work is finished. The contract price for the trench should be based on an agreed price of so much per cubic yard, with further agreement that the trench be completed as quickly as possible. The digging of small trenches usually can be done more quickly and cheaply with picks and shovels. Contractors who undertake to dig large trenches should be equipped with the necessary machinery to do the job quickly and properly.

Contracts should be made in writing, stating the amount of dirt to be moved, additional cost where blasting is found necessary, whether the price is to include filling the trench, and all other essential details. Contracts for digging trenches should be signed by both the contractor and the agent for the Department.

Trenches should be about 7 feet deep and not less than 7 feet wide. The length may be calculated by allowing 14 square feet of floor space for adult cattle weighing from 1,000 to 1,200 pounds each and varying the space proportionately when the animals are smaller. Usually there is room in such a trench for the additional number of hogs and sheep found on the average farm, allowing 4 mature hogs or sheep for each cow weighing approximately 1,000 pounds. If the number of hogs and sheep exceeds this proportion, additional space should be provided, calculating 14 square feet of floor space for 6 to 8 hogs weighing 200 pounds each, or 8 to 10 sheep.

If the sides and one end of the trench are made perpendicular, with the remaining end sloping, the animals generally may be driven into the trench and confined there by building a fence across the open end. In this position they can be slaughtered with little labor. Occasionally, when the herd is small, it may be found advisable to construct a temporary pen at the side of the trench. The animals are driven into the pen, shot, and their bodies rolled into the trench after being dragged to the side of the trench. Usually trenches should be dug at convenient points, near the affected animals, in order that they need not be driven over uninfected territory, but in certain localities, as, for instance, infected ranges, it will be found expedient to concentrate animals at a central point for slaughter and burial.

Bills for digging trenches should specify the dimensions of the trench, the number of cubic yards of material moved, the price per yard, and indicate whether the price includes filling the trench. Bills should be submitted in duplicate and bear the O. K.

of the inspector under whose supervision the work was done.

Slaughtering the animals.—One trained lay inspector should be placed in charge of each slaughtering crew with one or more lay inspectors as assistants. One man in charge and two assistants are usually sufficient to constitute a slaughtering crew, and in case of small herds two men only are necessary. Veterinarians should not be detailed to slaughtering crews, as their services are more important in their professional capacity.

Handling and slaughtering of all condemned animals should be done in the most humane manner possible. The animals should be killed by shooting. Only competent marksmen (not more than two or three in large herds) designated by the lay inspector in charge of the killing, should do the shooting. A rifle of sufficiently large caliber to kill instantly should be selected. A 25-20 rifle or a similar gun is recommended. Aim should be taken with a view to piercing the brain.

Slashing hides and evisceration of carcasses.—The eviscerating, slashing of the hides, and other details should be performed by competent laborers.

After the animals are dead the thoracic cavities and the paunches should be opened freely and the hides slashed in various places to render them valueless for commercial use. After opening and slashing, the carcasses should be covered with unslaked lime. The amount of lime used may vary with local conditions, the ability to procure the lime, accessibility of the trench, etc. One barrel of lime for every 8 to 10 cattle or 15 to 18 sheep or swine is usually sufficient. If the animals are large, more lime should be used.

Filling trench, disinfecting implements, etc.—The trench should be filled with earth without delay according to instructions under heading "Trenches for burying animals" and a representative of the State or the Department should remain on the premises to supervise the work. The clothing of the men and all implements and articles used, including plows, scrapers, trucks, wooden mats, horses' feet and legs, also their bodies if soiled, shall be disinfected under supervision before they are removed from the premises. The outer garments provided for the men employed in the work should be soaked in a 3-percent solution of formalin or boiled before they are sent to the laundry. If rubber boots cannot be provided, the shoes of the workers should be thoroughly cleaned and washed with a disinfectant before they leave the premises.

Disposal under extraordinary conditions.—In some localities burial of animals in trenches may offer unusual difficulties, such as the presence of water too near the surface, extensive outcroppings of rocks, or other natural difficulties. Under such conditions the preparation of trenches may involve long delays or prohibitive expense. One means of meeting difficulties of these kinds is the cremation of the carcasses, using oil, preferably, for fuel. To facilitate burning, the carcasses should be elevated from the ground, as on a network of heavy iron rods resting on stones. Since burning gives rise to offensive odors, this method should be avoided, if possible, in closely settled communities.

Where gullies or abandoned railroad cuts are available they may be utilized after making them conform to the general dimensions of trenches. In hilly regions where the ground is entirely too rocky for

excavating, dynamite may be used for blasting the sides of ravines so the débris may fall over the carcasses of the animals which have previously been driven into the ravines and shot. The usual depth of burial must be observed. These methods are for emergency use only, when the customary method of digging trenches is not feasible, and such departures from the standard method of burying animals in dug trenches should be followed only with the approval of the supervising inspector.

CLEANING AND DISINFECTION OF PREMISES

Disinfecting crew.—A veterinarian will be in charge, in each State, of the cleaning and disinfecting operations. A disinfecting crew consisting of a lay inspector and from 7 to 12 laborers has been found most satisfactory, efficient, and economical. The lay inspector should be competent to take charge of the crew during the absence of the veterinarian in charge.

After the animals are slaughtered and buried, the infected premises should be cleaned and disinfected without delay. An accurate record should be kept by the lay inspector, showing the names of the men hired for work on the crew, number of hours each man worked, the dates, the rate of pay per hour, and the total amount of compensation due. The time book should be sent to the district office at stated periods in order that pay rolls may be properly prepared.

Equipment of crew.—The inspector in charge of the disinfecting crew, his assistant, and two nozzle-men should be supplied with complete rubber outfits, each consisting of coat, boots, hat, and gloves. Overalls and jumpers should be provided for the remainder of the men. These outer garments should be removed at the end of each day's work and left on the premises,

and before the crew moves to another farm or premises should be thoroughly disinfected. In order to hasten the work of cleaning and disinfecting infected premises, the inspector in charge of the disinfecting work should precede his crew with a view of planning the work in advance and inducing the owners to haul out the manure and clean the barns and outbuildings preparatory to disinfection.

Standard equipment for a disinfecting crew of 12 men should consist of the following:

5 manure forks (five-tine).	1 pair pliers.
3 scrapers (long-handled).	2 milk cans (10-gallon).
3 ship scrapers.	1 pail (galvanized, 12-quart).
3 flat shovels (long-handled).	1 force pump.
2 scoop shovels.	100 feet $\frac{3}{4}$ - inch pressure hose.
3 hoes.	1 spray gun.
3 garden rakes.	4 rubber coats
3 heavy brooms.	6 pairs rubber gloves.
1 fiber push broom.	24 suits (overalls and jumpers).
1 ax.	
1 crowbar.	
1 pick.	
1 hatchet.	

In order to facilitate the transportation of the pumps and equipment, it is advisable to have made for each outfit a wooden chest fitted with lock and key. This chest should be made like a carpenter's tool chest. The equipment should be marked as specified under "Care of supplies" (p. 12).

Destruction of property.—Upon arrival at infected premises the inspector in charge of the disinfecting crew should make an inspection to ascertain whether it is necessary to destroy any property in order to get rid of the infection. He should destroy only what he has to, to rid the premises of infection.

Record of property destroyed.—An accurate record should be kept of all property destroyed in disposing

of herds and cleaning and disinfecting premises, giving the measurements, kind, and quality. The owner or his representative should be requested to be present when the measurements are taken or other records made of property destroyed, and before the inspector leaves the premises he and owner should jointly sign this report. Such statements, or the book in which such records are kept, should be forwarded as promptly as practicable to the office of the inspector in charge of the district in order that vouchers may be prepared and sent to the owner. The following form of statement is suggested:

Owner _____
Township _____
County _____ State _____
P. O. address _____
350 feet 2-inch pine plank (old and worn);
500 pounds timothy hay;
600 pounds straw;
20 grain bags (fair);
etc.

(Signed) _____
Inspector

Owner
Date _____

Records should be complete in order to avoid the necessity of sending another representative to the premises later to appraise the property destroyed. In order that there may be uniformity in adjusting claims of this kind, the inspector in charge of the disinfecting crew should adjust the claims and make the agreement with the various owners as to prices.

Payment for property destroyed.—In settling for property destroyed the inspector in charge of a sta-

tion should inform himself regarding the price of hay, straw, lumber, etc., in the locality where such property was destroyed, and in settling claims allow prices accordingly, making fair allowance for waste in replacing lumber and for hardware, etc.

Cleaning and scrubbing buildings, etc.—All manure, loose litter, and trash should be removed from the interior of buildings and burned. Barns and other buildings should be swept down thoroughly and all overhead beams or other projections should be thoroughly cleaned. In case there are stalls, mangers, feed boxes, wooden floors, etc., which are decayed or in such condition that they cannot be thoroughly disinfected, they may be torn out and burned after being measured as heretofore described (pp. 23 and 24). Before such property is destroyed the condition of the lumber, the time of exposure, and the opportunity for infection should be taken into consideration, and it should be carefully borne in mind that if the virus of foot-and-mouth disease can be reached by disinfectants it can be killed with less expense than it will cost to tear out and replace.

Disinfection can be more successfully and easily accomplished when the buildings have first been thoroughly cleaned. Manure should be cleaned out of cracks, posts, stanchions, etc., and any contamination by saliva should be scraped and scrubbed. For this latter purpose a hot solution of sal soda is usually of assistance.

Selection and application of disinfectants.—A power spray outfit, capable of developing high pressure, is the most satisfactory and effective means of applying disinfectants to large surfaces, such as walls, ceilings, stanchions, floors, corrals, manure

piles, haystacks, strawstacks, etc. A barrel or bucket spray pump is satisfactory for smaller stables, etc.

Care should be exercised in selecting suitable disinfectants. Sodium hydroxide in the form of commercial caustic soda or lye is the most suitable for general disinfection. The caustic soda or lye should contain at least 90 percent of actual sodium hydroxide. The disinfecting solution is prepared by dissolving 2 pounds of lye in 10 gallons of water. If hydrated or water slaked (*not air-slaked*) lime is available, a satisfactory disinfecting solution may be prepared by dissolving 1 pound of lye in 10 gallons of water and adding to this 5 pounds of lime. The addition of lime to a solution of sodium hydroxide tends to prevent conversion of the hydroxide to carbonate. The lime is also useful as an indicator to show where the solution has been applied.

Concentrated lye is a caustic poison. Care should be taken to avoid getting it into the eyes or breathing any of the fine dust that may arise where the dry material is handled. The comparatively weak solution employed for disinfection may be used with safety provided a reasonable degree of care is exercised. Washing with water will usually be sufficient to remove the lye solution should any get on the skin. If necessary, it may be neutralized by washing with vinegar. Should any of the lye solution get in the eyes, they may be washed with clean water, to be followed by a saturated water solution of boric acid.

The dilute lye solution has little or no harmful effect on bare wood, rubber, or cotton. It is injurious to painted or varnished surfaces and to woolen or silk fabrics if allowed to remain in contact with them for a considerable period of time. Leather, especially when oiled, will stand some exposure, but it is better

to avoid unnecessary exposure. Lye solution may be kept in containers made of bare wood, earthenware, enamelware, or any of the common metals except aluminum. The containers should be kept tightly covered to prevent the conversion of hydroxide to carbonate, which is much less active than the hydroxide.

A 4-percent solution of formaldehyde is considered most suitable for hay, straw, chains, bells, halters, ropes, harness, blankets, feed bags, and finished surface of walls, ceilings, etc.

Chloride of lime is satisfactory for outside disinfection where there is plenty of air, as, for instance, in manure piles, open sheds and stock pens, and on the ground, etc., but the fumes are very irritating and injurious to those who attempt to spray with it in closed buildings.

Satisfactory results have been obtained from the use of permitted cresylic disinfectants (formerly known as saponified cresol) in previous outbreaks of foot-and-mouth disease. While sodium hydroxide is preferred in the disinfection of premises exposed to foot-and-mouth disease, the cresylic disinfectants permitted in official disinfection should be used when they are more quickly available than lye and will expedite the cleaning and disinfection of infectious premises and transportation equipment.

Formaldehyde gas is suitable for disinfecting dwellings, cellars, milkhouses, granaries, and other tight buildings.

Rooms containing furniture or other materials that may be injured by wetting may be disinfected by formaldehyde gas, and clothing and other articles that cannot be dipped or sprayed may be hung up in

such rooms and disinfected by the gas for 6 or 8 hours if better methods are not available.

In fumigating buildings with formaldehyde gas, 20 ounces of formaldehyde solution U. S. P. (40 percent formaldehyde gas) to 16½ ounces of potassium permanganate is required to disinfect 1,000 cubic feet of air space. A violent chemical reaction takes place immediately when the formaldehyde solution and permanganate are brought together.

Ordinarily there is no danger of fire with this method. In exceptional cases, however, sparks may be given off from the mixture, so that it is desirable to place the container inside a large open pot and to have no combustible material in the immediate vicinity of the chemicals.

In disinfecting with formaldehyde gas it is essential that a sufficient quantity of gas be liberated and that it be held within the compartment that is to be disinfected for a sufficient length of time to accomplish the destruction of the germs of disease. The gas escapes very readily through any openings or crevices around windows, doors, or elsewhere. Hence it is essential that compartments to be disinfected by formaldehyde gas be tightly closed and that all openings be sealed during the period of disinfection. It is well to remember also that the temperature is an important factor in disinfecting with gaseous formaldehyde, as this disinfectant is much more energetic in a warm than in a cold atmosphere. If the temperature is much below 65° F. disinfection with gaseous formaldehyde cannot be relied upon under ordinary circumstances. It is desirable also that the air be moist, even in dry weather. In cold weather compartments should be heated.

(Formaldehyde is usually dispensed in a 40-percent solution. Ten parts of this solution added to 90 parts of water give a 4-percent formaldehyde solution.)

Methods of using this and other disinfectants are clearly explained in Farmers' Bulletin 926, *Some Common Disinfectants*.

Infected hay and straw.—Where haymows, haystacks, and strawstacks have been infected by animals feeding from the sides or trampling upon them, the exposed sides and top should be thoroughly raked off or cut down for a distance of from $1\frac{1}{2}$ to 2 feet, and the remainder of the stack sprayed with a 4-percent formaldehyde solution. The hay or straw removed from the infected stacks should be measured and burned, a record being kept of the amount destroyed in order that adjustment may be made.

Disposal of manure.—After manure has been disinfected as described in these instructions, if weather and field conditions permit, it may be hauled out and spread upon a field to be plowed, where it is not accessible to swine or ruminants. If it is impossible to disinfect and spread the manure at the time, it should be hauled to some convenient spot, the surface forked over and mixed with chloride of lime to a depth of from 6 to 10 inches, and the top sprinkled with chloride of lime, or a layer of 6 inches of uncontaminated horse manure may be put on it. A strong, pig-proof fence should then be built about the pile. After the removal of this pile of manure the ground on which it lay should be limed and left exposed to the sun for a period of at least 30 days.

All litter and manure which have accumulated in the barn lots prior to the slaughter of the stock must be cleaned up, piled, and burned, thoroughly disinfected, or fenced away from livestock. All ground

from which the litter or manure is removed must be left exposed to the sun for a period of at least 30 days before permission is given to restock.

Disinfection of dogs, poultry, etc.—Immediately upon the quarantining of infected premises, all dogs, poultry, etc., should be confined until disinfection of the premises is completed. Before being released, poultry, dogs, etc., should be dipped under the supervision of an inspector. Such animals may be dipped in a slightly warmed solution containing about 2 percent of cresylic disinfectant, or disinfected in such other manner as may be prescribed by the Chief of the Bureau.

Thoroughness essential.—Disinfection work should be completed as rapidly as possible, but it should be borne in mind that thoroughness is essential to the success of the work. Care should be taken that all shoes, clothing, implements, and equipment used by the owner or his help in the care of the infected herd are either destroyed or thoroughly disinfected before the disinfecting crew leaves the premises. If conditions are such that improvements can be suggested in the manner of disinfection herein prescribed such plans should be immediately reported to the inspector in charge of the work.

TESTING PREMISES AND RESTOCKING

Provided there is no active infection in the community, the testing of any premises may be commenced 30 days after the date the cleaning and disinfection was completed. The number of test animals should be determined according to the size of the area to be covered. Hogs and yearling calves are the most desirable for testing purposes. When placing test animals on premises care should be taken

to eliminate feeds which might cause conditions or lesions that would complicate the diagnosis of foot-and-mouth disease. The inspection of the test animals should commence 48 hours after they are placed on the premises and be repeated every 48 hours for 10 days, after which semiweekly inspections should be continued to the end of the 30-day test period, when the owner may be allowed to restock gradually. Weekly inspections should be continued regularly during the 60 days following the 30-day test period. At the end of 90 days from the date the test was commenced, provided no disease has appeared, the premises may be released from quarantine. Conditions might arise which would make it advisable to vary this procedure.

DISINFECTION OF CARS

Period of exposure.—All railroad cars, motor-trucks, and other vehicles which have carried livestock in any quarantined area within a period of 30 days of the date of an outbreak of the disease, except those cars that have already been cleaned and disinfected since last used, must be cleaned and disinfected.

Method.—The rules for cleaning and disinfecting cars should be essentially those governing the disinfection of buildings. Both the exterior and interior surfaces and all corners and crevices should be cleaned. The interior surfaces, including car doors, should be washed with clean water applied by a hose, after which they should be sprayed liberally with a permitted disinfectant.

For disinfecting boxcars and refrigerator cars to be used for carrying commodities such as fruit, vegetables, and dairy products which absorb odors, a 2-

percent solution of formalin should be used and the doors kept closed until an hour before loading.

A card, P. S. Form 62 C, filled in on both sides with a weatherproof pencil, should be attached to each side of each car cleaned and disinfected.

All manure or litter removed from infected or exposed cars and stockyards shall be burned, disinfected, or piled where it is not accessible to livestock. During winter weather any immovable frozen material on the floors of cars should be covered with air-slaked lime not less than 2 inches deep.

Records of cars cleaned.—All employees supervising the work of cleaning and disinfecting cars should be instructed to take the numbers and initials of the cars cleaned and disinfected from the cars and not from the railroad records, and to make a careful check before reporting. When the car reported cleaned and disinfected is not a livestock car, the class of car to which it belongs should be clearly indicated, "box," "gondola," etc.

MISCELLANEOUS

Competition in the purchase of supplies.—Generally the emergency is so great that no delays to procure competition are expected. Where such competition may be had without danger or undue delay, as in a district where the work is organized and proceeding in a routine way, informal quotations may be obtained from several dealers (three, for instance), the lowest accepted, and the several quotations attached to the bill when sent to Washington for payment. Bids on trenching work may be handled similarly, when practicable.

Forwarding reports.—Inspectors in charge should forward promptly to the Bureau at Washington all

forms provided for the purpose of keeping records of animals infected, slaughtered, disinfection of premises, cars cleaned, and disinfected, etc. Inspectors engaged in locating infected herds should include in their reports the manner in which infection was carried to the herds, and any other items of value. Reports should be filled out carefully and in a legible manner. In addition to these reports, daily telegraphic letters should be forwarded each night as specified under "Reports to headquarters" (p. 16), and such other information as may be of value or interest.

Resistance to inspectors.—Where inspectors are forbidden admittance to premises, or to make examination of animals in suspected territory, no physical force should be offered. Every effort should be made, however, courteously to convince the owner of the premises or stock of the necessity for making such examination. Failing to obtain admittance to the premises, the inspector should notify the station inspector in charge, who will immediately take the matter up with the State officials with a view to having the inspector accompanied by a local police official. Pending admittance to the premises or animals, the inspector should immediately call on the State authorities to place such premises or animals under close quarantine, under guard, until the examination can be made.

When inspectors are forcibly assaulted no resistance should be shown except that actuated by self-defense. Telegraphic notice should be at once forwarded, through the inspector in charge, to the Chief of the Bureau, who will advise of the legal action to be taken.

Shipments from quarantined areas.—When permission is obtained from the Secretary to move livestock from a quarantined area for immediate slaughter, arrangements should be made in advance to handle the animals through specially designated chutes and yards away from other susceptible animals and to have them slaughtered within a specified time.

In some instances where shipments of livestock originating in quarantined areas have been permitted for immediate slaughter only, such shipments have been diverted or sold at point of destination as stockers or feeders, and infection of new territory has resulted. Efforts should be made to see that shipments of livestock so consigned are slaughtered with as little delay as possible, and the cooperation of the State authorities should be enlisted to this end.

Infection at establishments under Federal meat inspection.—Where animals are found infected in the pens of an establishment under Federal meat inspection the carcasses should be condemned under the meat-inspection regulations. The hides from such carcasses should be condemned or treated in accordance with a method prescribed by the Chief of the Bureau. The outer clothing of all workers in the establishment, which might have become contaminated, and all implements and utensils, should be sterilized. The killing floors, knocking and bleeding pens, alleys, chutes, infected and exposed pens, coolers, and the cars, boats, automobiles, or other vehicles in which the animals were shipped should be thoroughly cleaned and disinfected.

Immediately the shipment should be traced back to the premises from which it came to ascertain whether other animals in the community or any that came in

contact with them or passed through the same chutes, pens, or conveyances, are infected.

Violation of quarantine regulations.—Where infection is discovered following any violation of the quarantine regulations, no appraisement of animals so handled should be made by Bureau inspectors without special authorization from the Chief of the Bureau.

Method of dividing the payment of expenses.—Payments of indemnities for animals slaughtered and properly destroyed are limited by law, the Department being permitted to pay not more than one-half the appraised values, except in case of an extraordinary emergency to be determined by the Secretary. As nearly as possible such expenses as those enumerated below should be shared 50-50 by the State and the Department:

Hire of men employed in the slaughter and burial of animals; hire of men employed in disinfecting infected premises; transporting slaughter crews and disinfecting crews; purchase of guns and ammunition; purchase of supplies, including hardware, disinfectants, rubber goods, jumpers, and lime; freight and cartage on supplies used in the work; trenching and refilling; rents or storage charges for storing disinfecting supplies; and similar items as may be agreed upon.

Expenditures for salaries of regular Department employees, their reimbursement for travel expenses, telephone and telegraph, and office supplies and forms used by the Department forces are generally taken care of entirely by the Department.

Reporting unexpended property at completion of work.—Upon completion of the work at the end of an outbreak, Bureau employees should furnish the Washington office with an alphabetical list in duplicate of all the nonexpendable property in their pos-

session, used especially in connection with foot-and-mouth disease, giving the condition of the various articles. As soon as pumps, guns, tools, hoes, picks, etc., are no longer needed for constant use they should be properly and thoroughly cleaned and all articles that are apt to rust should be coated with petrolatum or oiled or painted. Hoes, rakes, shovels, etc., should be bundled and securely wired together and preparations made for boxing or otherwise packing them for shipment in compliance with instructions.

